

# AVIATION WEEK

A MCGRAW-HILL PUBLICATION

OCT. 11, 1948



## **Tough customer yesterday — TOUGHER yet today**

Far the backbone of its air fleet the U. S. Navy traditionally puts its faith in aircraft types that have thoroughly proved themselves in service. Today, the battle-proved Vought Corsairs proudly serve as the Navy's front-line fighter-bombers. Advanced far beyond their wartime predecessors, highly developed models of the F4U will continue to join the fleet well into 1949.

Meanwhile, a whole new generation of Vought airplanes is in the making. Right now they are going through the gruelling tests that will prove them for service with the fleet in years to come.

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STRATFORD, CONNECTICUT

ONE OF THE FOUR DIVISIONS OF UNITED AIRCRAFT CORPORATION

Add the Boeing B-50 to the growing list of modern aircraft that are capitalizing on the lighter weight, stronger construction and accurate pre-testing of FEATHER-WEIGHT oil coolers.

These modern FEATHER-WEIGHTS get their minimum weight and maximum resistance to extremes of temperature, vibration and shear from patented aluminum-alloy bracing of their thin all-aluminum sections.

How FEATHER-WEIGHTS will perform under actual flying conditions is clearly forecasted by critical tests in Clifford's wind tunnel laboratory, the largest, most modern in the aeronautical heat exchanger industry.

Inquiries concerning FEATHER-WEIGHT all-aluminum oil coolers are invited.

CLIFFORD MANUFACTURING COMPANY,  
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## Boeing B-50

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**FEATHER-WEIGHTS**

FOR OIL COOLING



The Boeing B-50 bomber... a faster, more powerful, border-hitting version of the famous B29 Superfortress... is reported to be the nucleus of the Air Force's long-range bombardment program.

# CLIFFORD



ALL-ALUMINUM OIL COOLERS

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## Even the Air is Washed



Where New Departure micro-instrument ball bearings are assembled and inspected, you will find filtered air, a constant temperature, rayon masks and hot gloves guarding these precision products

against dirt and loss.

New Departure engineers are heavily aware that the correct readings of aircraft instruments depend upon the friction-free movement of their sensitive ball bearings.

You may confidently depend on the New Departure division of General Motors for the world's largest and most modern facilities for this highly specialized manufacturing



Before entering a micro-instrument bearing working area, operators tread on special domes of sticky gelatin which removes dust and other loose particles from shoes.

The air pressure of the room is greater than outside — as when vestibule door is opened an uncontaminated air will enter.



The completed ball bearings, having passed every exacting test for perfection in precision dimension, internal slip and axial clearance are then housed in thermoplastic containers securely fastened from harm or contamination.

*Nothing Rolls Like a Ball*

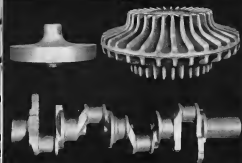
## NEW DEPARTURE

MICRO-INSTRUMENT BALL BEARINGS

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONNECTICUT

AVIATION WEEK, October 12, 1948





*Wyman-Gordon—specialists in the vital forgings of the internal combustion engine since its inception—is today the largest producer of crankshafts for the automotive industry and of all types of forgings for the aircraft industry.*

*Be it crankshafts and other vital forgings for the piston type engines or turbine wheels and impellers for turbo jets—there is no substitute for Wyman-Gordon experience.*

*Standard of the Industry for More Than Sixty Years*

**WYMAN-GORDON**

*Forgings of Aluminum, Magnesium, Steel*

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HARVEY, ILLINOIS

DETROIT, MICHIGAN

## THE AVIATION WEEK

### New Pattern for CAA

Vigorous Delos W. Rentschler, last week was finally ready to move at CAA.

For three months, since he took office in June as administrator of civil aeronautics, he has been studying and checking his organization. He has talked to industry people and qualified observers, about the patent weaknesses of the huge 17,300-mile federal agency charged with administering federal aviation regulations and with promoting aviation. He has checked the work of the key personnel and he has talked to hundreds of CAA people in the lower echelons.

Finally, after slogging countless trial organization charts, and after long consultations with a few trusted associates, he announced last week a reorganization plan which both CAA personnel and the aviation industry had anxiously, and perhaps faintly, awaited.

### Responsibility Is Placed

Proof of the Rentschler reorganization will be in the functioning of CAA after a 30-day period which may come to an end through the remainder of 1948. But on paper, it looks as if the 46-year-old six-footer from Texas has set a more efficient pattern for the ponderous, assembly agency than it has seen perhaps since it came into being 10 years ago.

Key to the Rentschler plan is a solidification of authorities and responsibilities, combined with a new grouping of related functions in the same divisions. Rentschler promises to be a reduction of the most serious problem of any federal agency—overlapping on an equal level.

Behind the big reshuffle was an apparent awareness of changing conditions in U. S. aviation, which necessitated a changed federal agency to cope with them.

New emphasis on necessity for close coordination of civil and military aviation, decline of personal aviation as a factor in the overall picture, difficulties of the air transport industry which could be mitigated or lessened by the intelligence with which necessary regulations are administered, and above all—the growth of the aviation industry to a point where responsibilities must be delegated to it which formerly were jealously guarded by the federal agency—all these were factors behind the new CAA pattern.

### Regional Revamping

Probably most important in its immediate effect on aviation is the thorough readjustment of the CAA regional offices. No longer is aviation safety a divided responsibility.

It is centralized, for aviation, aircraft, aviation schools, fixed base operators, and air carriers, both scheduled and unscheduled, is a single division. The CAA regional divisions which long have been a deterring influence on

aviation progress are placed in proper perspective as an adjunct of the aviation standards branch.

Similarly, a facilities division for an navigation program, the engineering work of design, construction, and maintenance of such facilities functionally, rather than geographically, is now groups of civil engineers and electronic engineers, as did the old setup.

Rentschler thinks CAA will have a bigger budget, but less its administration. He looks forward to big expenditures in the great RTCA program and colossal expenditures in airports, which he considers CAA will be better equipped to handle as a result of its first years of experience, and the frank and often loud criticism of unnecessary CAA airport aid type which accompanied their years.

### Old Guard Losing Ground

Wiser heads in CAA now a plain warning in Del Rentschler's statement that the regional administration was to do the operating and the Washington staff was to do the planning, that both the regional top men and the Washington planners were finally responsible to him, and that "they must realize that their action are consistent with orders which I personally issue." It spelled trouble for CAA old guard tactics. In time past, one of the big troubles with CAA had been the sheer radical difference between the views expressed by a CAA administrator and the way they were later interpreted by his subordinates.

Key subordinates in the reorganized CAA appear to be Fred Lee, deputy administrator of Ed Stuchlik, director of business administration, and Rentschler's assistant, Donald Nyrop. Transfer of H. A. Heik from the hot spot of deputy administrator for airports, and expected transfer of Al Koch from another hot spot of criticism, deputy administrator for aviation aid, makes room for progressive replacements in these spots.

### After Election, What?

Observers will be interested to see whether the new Rentschler reorganization has a real chance to take effect. Rentschler is reported to be a strong Republican in Long Island, and Republicans in Congress pushed through confirmation of his appointment last spring. In the likelihood of a changing administration, Rentschler could reverse the change.

Whether the current CAA reorganization is enough to satisfy Congress, however, may be something else. Rentschler says it is the beginning and that he will push for additional efficiency recommendations in the field and in Washington. But whether his best efforts will satisfy Congress, and the House Committee for Reorganization, two reasons to be seen. Perhaps Rentschler may stay on, and on the other hand, perhaps he may choose to accept a handsome offer from the radio industry, and go back to private life.

# AVITRUC

## VERSATILITY

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DESIGNED FOR THE JOB—  
THAT'S AVITRUC

A fast cargo and troop carrier  
which can be transformed on the  
spot, quickly and effectively, to  
meet any emergency requirement

DESIGNED  
FOR THE JOB

**hase** AIRCRAFT CO., Inc.  
WEST TRENTON, NEW JERSEY

### AVIATION CALENDAR

Oct. 1-14—Tenth State Fair Aviation Show  
Cedar

Oct. 14—Annual Air Line Transportation  
Association convention, Sheraton Hotel,  
Chicago, Ill.

Oct. 15-16—Air Transport Association annual  
meeting, Orlando, Fla.

Oct. 16—National Fuel Institute, Philadelphia  
Airlines Company Club, Wings Field, Air  
Hotel, Pa.

Oct. 16-18—International aviation exhibit,  
Royal Canadian Aerochemical Society, In-  
terchange

Oct. 16-18—Age of Mankind, Lambert St.  
Louis Municipal Airport, sponsored by  
Municipality St. Louis Aviation Council  
and the City of St. Louis

Oct. 17-18—National Airlines Clinic, Bal-  
timore

Oct. 18—ATA annual meeting, Seattle  
Cairmont

Oct. 18-19—Shipping Society of Travel  
Airlines, New York, N.Y.

Oct. 19-21—Military Aviation Council Air  
Transport Section, Hotel Statens Capi-  
talen

Oct. 19-21—Society of Automotive Engi-  
neers aviation meeting, Hotel Statens  
Cairmont

Oct. 19-21—48 Annual Airline Aviation  
Conference, sponsored by Chamber of  
Commerce, Montreal

Oct. 19-21—Radio Flying Forum, sponsored  
by American Radio

Oct. 19-21—Third annual Airline Aviation  
Conference, Purdue University, Lafayette  
Ind.

Oct. 19-21—Society of Automotive Engineers  
aviation meeting, Transportation and  
mechanical meeting, Brookhaven State  
Fair, New York City

Nov. 4-6—Society of Automotive Engineers  
Tenth and subsequent meeting, Sheraton  
Hotel, Dallas, Texas

Nov. 4-6—Flight Safety Foundation air-  
craft accident investigation meeting, West-  
gate Hotel, Miami

Nov. 15-16—American Society for Testing  
Materials, aviation products and test  
equipment, Hotel Statens Cairmont

Nov. 15-16—Aviation, Maintenance and  
Manufacturing, with annual meet-  
ing, Hotel Statens Cairmont

Nov. 15-16—Aviation, Traveler  
Association, annual meeting, Alton Hotel,  
Chicago

Nov. 15-16—Aviation Society for Testing  
Materials, aviation products and test  
equipment, Hotel Statens Cairmont

Nov. 15-16—National Association of Travel  
Airlines, Hotel Statens Cairmont

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### NEWS DIGEST

#### DOMESTIC

Malcolm F. Ferguson, Bendix Avia-  
tion Corp. president, has been elected  
chairman of the East Coast Manufacturer's  
Council of Aircraft Industries Asso-  
ciation. New vice chairman is J. S.  
McDonald, president of McDonnell  
Aircraft Corp. Ferguson, formerly vice  
chairman, succeeds J. Carlton Wood,  
Fairchild's board chairman.

Dwight L. Reinhardt, president of Air  
Line Pilot Association, has been elected  
first president of International Federa-  
tion of Air Line Pilots Association,  
composed of pilots representing approxi-  
mately 15 nations.

"Transit Traffic," Navy's latest  
Lookheed F4V patrol plane which holds  
world's long-distance record, landed at  
San Diego, Calif., for emergency radio  
repair on an attempted 6145-mile  
Panama, Md. to San Diego, Calif., nonstop  
flight. It was by 731 miles.

Ensign Alvin J. John David  
Hosmer was awarded the Air Medal Flyer's  
Medal of Honor by Postmaster  
John Davidson for saving lives of  
seven passengers in a forced landing near  
Minneapolis, Minn., Oct. 18, 1948.

#### FINANCIAL

Douglas Aircraft Co. report to Secor-  
ty Exchange Commission late re-  
sults of \$13,648,281 for quarter ending  
Aug. 31, 1948. Douglas reports to SEC  
for last four months show sales totaling  
\$61,187,099.

Lockheed Aircraft Corp. reports net  
income for first six months of \$5,310,-  
151, including tax credit figured on  
first-quarter earnings.

#### FOREIGN

Secret Civil Airways that work are  
about to start in water schedules, and  
will operate at night for the first time  
on Moscow-Moscow run.

Argentina's FAMA airline has taken  
delivery on Boeing 470s at the fifth of  
an DC-4s it has had on order. FAMA  
hopes to open Argentina-C. S. service  
with the new planes.

Aviation meets on air force at  
least 12,000 men, Minister for Air A. S.  
Devedoff told the Air Force Associa-  
tion.

Norway's summer air traffic carried  
an internal route by the Scandinavian  
Aviation System from April 19 to the  
end of August totaled 28,547 passen-  
gers.

Bolivia has signed a bilateral air  
transport agreement with the U. S.,  
granting traffic rights to U. S. airlines  
at La Paz, Cochabamba, Santa Cruz,  
Robore, Chica, and Puerto Suarez.

### INDUSTRY OBSERVER

Navy will buy several different versions of the Douglas A1D, carrier  
based plane to be powered by a Wright engine. In addition  
to the standard attack version, the A1D will be modified as a special  
attack plane for anti-submarine work, a radar counter-attack plane and  
a night bomber.

Underlying single point landing, which is about three times as fast  
as current methods, will be increased into Cessna's B-36, North  
American's B-45, and Boeing's B-36, B-45, and B-47. In addition to  
speed, the single point method is necessary for actual landing operations.  
USAF has developed a new to test technique for actual landing that  
appears to offer some advantage over conventional practice.

As part of an overall investigation of fire hazards, Correll Aerochemical  
Laboratory is studying possibility of existing air transport fuel tanks to the  
wing tips. Arrangement would be such that any tanks could be protected  
by one of them. Correll has been in studies of this arrangement on the  
Cessna's and reports that there would be no loss of speed or  
range in a wing tip equipped plane.

Experiments on the McDonnell "Little Flyer" jet helicopter are con-  
tinuing with the conversion from propeller to jet engine. Development is now  
under way on the use of helicopter power units to replace the present ones  
partially employed. The present units will not be as sensitive to rotor  
speed as the present ones. Flight speeds have been held to 35 mph  
while blade root stresses are being determined.

McDonnell Aircraft's project helicopter, first of its type known to have  
been flown, will be of particular interest to engine designers in that the  
engine has continuously short exhaust tubes, a feature of the length of  
the exhaust-tube tube of the engine. General Motors' engine,  
New McDonnell successfully the first a winged in security. There is  
speculation that each engine employs either multiple tubes for a single  
exhaust chamber or a new type of filter valve system at the  
air intake. A long-term engine would have proved important for  
helicopter use due to centrifugal forces imparted to the turbine structure.

Helicopter manufacturers anticipate a "very important" Air Force  
design competition next spring, with prospective production contracts  
of such size as to assure the extended good financial health of the winning  
company or companies. It is expected to be for a medium-size machine,  
which will apply to the testing and design experience of a majority of  
manufacturers now in business.

Douglas Aircraft's Stinson (D-558-2) has been making experimental  
flights at Muroc with JATO. Two JATO bottles, one on each side  
of the fuselage off the wing, are used. Tests are part of the thorough  
mushroom program for which the Skyrocket was designed.

Aviation has been reporting numerous "mechanical interruptions"  
on the Coast-Line Western's new flying water hydraulic line. Other  
airlines report some trouble, and difficulties reported on the engine  
and slow working on the wing. WAI has indicated by one of  
its Coast-Line flights to permit drop work of the planes, one at a time.  
Correll also will make modifications in the factory on the rest of West  
air's side of air transport.

USAF is taking its security problems with extreme seriousness now  
and is going underground to build protective forces of the "most level".  
Presently, most manufacturers who have products to bid in military  
plane construction, or are known to be preparing to bid on contracts  
which will involve classified data, are being given intensive security  
briefings long before they actually are active in production. The steps  
the agency is to be plug gaps which might expose new aircraft  
designs and manufacturing techniques.

POCTURE CREDITS  
McDonnell Aircraft Corp. (McDonnell) 44  
NACA, N.Y.



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and widely used

**UNBRAKO**  
Reg. U. S. Pat. Off.

## SOCKET SCREW PRODUCTS

The "Unbraiko" Industrial Wrenching Bolt (A), and the 100% Flush Head Socket Bolt (B), are practically "nuts" in the Aviation Field; they so easily meet the requirements of precision, resists fatigue and other stringent requisites of Aviation Engineering. And the other popularity acclaimed "Unbraiko" products, patented to the right, have proved themselves throughout industry for years as absolutely dependable.

Write us for the name and address of your nearest "Unbraiko" Industrial Distributor and for your copy of the "Unbraiko" Catalog.

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lowest prices with  
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(B)

## FLEX-LOC ONE-PIECE SELF-LOCKING NUTS "WON'T SHAKE LOOSE"



Because it is one piece, one metal, full thread, of one material, and because it is a rigid "one" "lock" and "tight" on all is one—pressure is built on a completely uniform surface and long life—the "Flex-Loc" is the really really assuredly "Right" complete.

### "UNBRAKO" SOCKET SET SCREW WITH KNURLED CUP POINT



"WON'T SHAKE LOOSE"  
The knurled cup point of the "Unbraiko" makes it a self locking feature. The knurled cup point is built into the screw thread—no extra steps required in the manufacturing process. (A) U. S. Pat. Off.

### "UNBRAKO" SOCKET SET SCREW WITH ENKURLED THREADS



"WON'T SHAKE LOOSE"  
The knurled threads on the cup of a "Unbraiko" make it a self locking feature. The knurled threads are built into the screw thread—no extra steps required in the manufacturing process. (B) U. S. Pat. Off.

### "UNBRAKO" ENKURLED SCREW HEAD CAP SCREW



The knurled head of the "Unbraiko" provides a self locking feature. The knurled head is built into the screw head—no extra steps required in the manufacturing process. (C) U. S. Pat. Off.

### "WALLOWBIL" KIT KIT



With this kit you can make your own self locking nuts. The kit contains a set of dies and a set of punches. The kit is built into the screw head—no extra steps required in the manufacturing process. (D) U. S. Pat. Off.

Vol. 56, No. 15

# AVIATION WEEK

Oct. 11, 1948

## Rentzel Housecleaning Hits CAA Heads

### Deputy administrators cut to one, jobs of seven assistants ended in reorganization.

By Alexander McFarley

First official disclosure last week of a housecleaning CAA reorganization which is to become effective Nov. 1 had cost of the 17,300 Washington and field employees of the federal agency widely evoking more details. Another local observer was the visibly affected aircraft industry.

Devin W. Rentzel, who has been planning the reorganization since he took office as administrator in June, and the new streamlining was aimed at eliminating duplication and overlapping, and should result in considerable economies in expenditures and personnel.

Policy Board Guide-Reorganization, he said, was intended to follow recommendations of the President's Air Policy Commission and the Congressional Air Policy Board, and also considered recommendations of the Brookings Institute which is serving the agency for the Hoover Commission.

First effects were felt in Washington as Rentzel's new top echelon organization where the following changes were announced:

George Burgess, one of two senior deputy administrators, was transferred to an executive post in Rentzel's office leaving Frederick B. Lee, as the single deputy administrator.

Each of seven assistants to the all-encompassing personal flying, research, technical, investigations, engineering, charts and statistics, and foreign operations (Germany) were abolished, and their functions transferred elsewhere in the organization.

Six advisory committees to the all-encompassing was transferred to report to various divisions instead of directly to the administrator.

Office of field operations, headed by Howard Rangel, assistant administrator, and charged with Washington supervision of the new CAA system, was abolished and Rangel was transferred to Rentzel's office.

Title of assistant administrator, held by five other CAA officials and Rangel was abolished, but four of the old heads

CAA offices at Washington—research, aviation safety, airways, and business management—continued to maintain their separate entities, headed by direct reports.

Transferor Shook—For since key CAA activities in Washington the reorganization would largely a change in title. Offices were transferred and a few appeared headed for reorganization as a result of changes in their jobs.

Ed Storch, assistant administrator, business management, William E. Kline, assistant administrator, airways, and Richard Elwell, general counsel, appeared to be set in their present post. Elwell, assistant to administrator for personal flying, was scheduled to be transferred to a similar post in the new aviation development office.

Strom Designated—Re Strom, most an administrative assistant, was scheduled to be transferred to a senior staff post in the new aviation development office.

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fight in formation service and air marking personnel, the last two functions taken from advisory offices.

Top Echelon Reorganization—The reorganization likewise reshuffled positions in the top echelon of the CAA system. New setup provided for a parallel structure with the Washington organization chairing in but as an operational planning and evaluation division, and a legal division as a counsel.

Eliminated as staff offices to the regional administrator were the regional medical office, foreign staff office, and the three assistants for personal flying, development, aviation training and information and statistics. Each regional administrator has one deputy administrator and one assistant to administrator.

Revised emphasis in streamlining the new organization plan that the basic function of the Washington staff was planning, evaluating and controlling the program is executed by the field offices. The reports the regional administrator to be readily accessible to him, or someone delegated by him.

The Washington division which was under the field was restructured to be one that they are "operational" and other divisions headed by the administrator or by other directors (assistant administrator).

Reporting Personnel Cut—A feature of the reorganization at Rentzel's office was the reduction of the number of persons reporting directly to the administrator. From 27 to 18. Similarly at the regional administrative level the number of persons reporting directly to the regional director is reduced from 17 to 13.

In the regional offices the business administration division, support division and the various operations divisions have been combined into one division and the same functions as in present. Reorganization of the regional headquarters are indicated into three areas: divisions, facilities, aircraft and safety support offices.

Reorganization—Reorganization of the regional headquarters is indicated into three areas: divisions, facilities, aircraft and safety support offices. Reorganization of the regional headquarters is indicated into three areas: divisions, facilities, aircraft and safety support offices.

BEAUMONT CHICAGO JENKINTOWN, PENNA. BOX 566 DETROIT INDIANAPOLIS SAN FRANCISCO ST. LOUIS



# World's Largest

Supersonic wind tunnel unveiled by NACA has 6x8 ft. test section.

By Robert Hots

Largest supersonic wind tunnel in the world now unveiled by the National Advisory Committee for Aeronautics during an inspection of the newly-awakened Lewis Memorial Laboratory at Cleveland.

Test section of the new tunnel is 8 ft. high and 6 ft. wide. It is designed for testing full scale models of turbojets and aircraft up to Mach 3 under conditions of temperature and pressure equivalent to flight conditions at 35,000 ft. The new tunnel compares with the 6.5 x 8 ft. test section at NACA's Ames (Calif.) Laboratory designed to test supersonic flows up to Mach 1.6.

Druckman, Air-Defense Section of the Cleveland Institute, in charge of its use from the test section into the atmosphere. Most wind tunnels recreate the air in the experiment. Air from the tunnel is discharged through a large circular diffuser fitted with six exhaust nozzles to reduce noise. The diffuser is enclosed in a concrete structure.

The Cleveland tunnel also features an adjustable throat with two stainless steel walls externally fixed to the ducted walls by means of hydraulic jacking screws. The flexible throat makes it possible to vary the speed to the flow through the test section.

► **Electronics**—The tunnel is powered by three electric motors arranged in a single shaft to provide a total of 55,000 hp. The motor data, an 18 ft. diameter, seven-stage axial flow compressor at speeds from 770 to 190 rpm. The compressor has nine 3,000 blades.

As the tunnel is drawn through the largest jet engine to be built in the country. It is capable of driving 2,700, 000 cubic ft. of air per minute through a low point of about 18 ft. diameter best by passing through beds of solid-state aluminum. Blended air passed through the drying beds to avoid corrosion at a rate of about 100 ft. per second.

► **Supersonic Compressor**—NACA also revealed more details of its supersonic compressor (Aeronautics Week, Oct. 20, 1947) that promises increased efficiency and weight saving in jet engine construction. The experimental compressor consisting of a single row of rotating blades operating at supersonic speeds



This 16-in. diameter nozzle (above) has been dropped by NACA from 30,000 ft. to obtain performance data on speed of Mach 3.4. Nozzle is mounted under wing of



NACA also revealed more details on its supersonic compressor diffuser, shown at its point with conical compressor

can do the work of a conventional axial-flow compressor's first row of blades operating at subsonic speeds. Shock waves forming on the leading edge of unsymmetrically designed compressor blades have barred operation at supersonic speeds.

Designs of the supersonic compressor blades fitted the shock waves on the leading edge of the blades to will

of an F32 (below). Long nozzle is nose of nozzle in laboratory aircraft through which data is transmitted to control which is based on the ground.

(right). Weight and space savings are required and supersonic compressor does the same amount of work.

models the compressor where they do not interfere with blade operation. These blade tips are travel more than 1000 mph with little loss in efficiency.

► **The Shock Engine**—Energy absorbed by the shock waves instead of passing the compressor blades is used further to compress the air to the desired high pressure required. One of the major types of compressor on production

model jet engines is expected to reach its considerable reduction in the length and weight of future jet engines.

Some more steps also were taken from the 16 in. diameter experimental compressor engines (Aeronautics Week, Oct. 20, 1947) used by NACA to obtain test data on jet type engine at speeds up to Mach 3.4. This engine, originally designed from a 18 20, is now carried to test altitudes of 30,000 ft. on a modified North American from Mustang (F82).

Compressor diameter of this experimental engine is 14 ft. long and 16 in. in diameter. Central compartment located within the inlet section houses radio transmitter, fuel and control. Front fin at the rear end of the turbine provides aerodynamic stability. The problem now under study by NACA is control of the shock waves leaving around compressor inlet at supersonic speeds.

During the inspection, the Cleveland Flight Propulsion Laboratory was formally renamed the Dr. George E. Lewis Memorial Laboratory in honor of the late NACA director of aeronautical research (Aeronautics Week, Feb. 19).

## 2-0-2s Get O. K.

NWA returns planes to service after grounding for tests following crash.

Northwest Airlines Market 2-0-2s were slated to go back in regular service last week for the first time since the car was voluntarily grounded the two-engine craft following the accident near Wenatchee, Wash., on Aug. 29.

NWA President Cecil Hunter and company's engine of 24 2-0-2s, should be flying within two weeks. During the month following the crash, the plane has undergone extensive airworthiness at their structure to determine the degree of structural damage they were subjected and what, if any, improvements and refinements could be effected.

► **Flaming Scheduled**—The Wenatchee crash, in which 27 persons were killed, occurred while the 2-0-2 was flying through a weather storm of tornado proportions. Cause of the accident has not been disclosed. A hearing is to be held at Wenatchee this week. Another NWA 2-0-2 which also passed through the storm area suffered a broken main gear on the right wing (Aeronautics Week, Sept. 15).

Shuster declared that results of the many tests conducted during the last five months show that some reports of the Civil Air Board's structural strength and load capacity were lower than actual. Shuster's decision, however, that an enlarged

## Fast Dive

A Racing Starfighter has been developed at 495 mph—faster than any other airplane in use has ever flown—the company announced last month.

N. D. Sherrill, Boeing assistant chief engineer, and the 70-ton vehicle attained the sound speed in a dive at full rated power. Purpose was to test the craft's aerodynamic and structural characteristics at extreme speeds. The aircraft, named "Boeing" and "Boeing" from 100 to 550 mph.

Diving from 21,000 ft. with Boeing Test Pilot James Foy at the controls, the double-delta aircraft went down to 12,000 ft. in 12 seconds, reaching the 495 mph maximum true speed just before the pull-out. It was the first time in a series of high-speed dives the aircraft was able to pull out without a violent stall. The aircraft was able to withstand stresses well in excess of any which might be encountered under the most severe airline operating conditions.

tailed instructions on the need for reducing speed in turbulent air, and Martin will advise CAA and Northwest of its own study of all developments.

► **Financial Troubles**—Meanwhile, Northwest has soured another appeal to CAA for higher temporary credit pay in other losses which were incurred by the 2-0-2 grounding.

In the "big five" test case of last April, CAA assessed NWA's temporary credit pay from \$6 to 75¢ cents a five mile, retroactive to Jan. 1. The carrier vigorously protested its grouping with the four industry peers—American, United, TWA and Eastern—for bad pay purposes and early last summer set a record of \$150 a ton mile to break one.

► **Patient Dilemma**—During the past several months the picture has darkened further. Northwest now states it will need \$2.65 a ton mile, retroactive to Jan. 1, to break even on domestic operations. The carrier said that under the present rate of 75¢ cents a ton mile it will lose between \$2,715,000 and \$4,044,000. Showing an increase in procedure is figured this year, compared to CAA's estimate of a \$2,114,000 profit for a future year.

## NAL Stockholders Uphold Management

The Civil Aeronautics Board's newly authorized investigation to determine whether Northwest Airlines should be dismantled and parceled out among at least three viable entities failed to bring about a management upheaval during NAL's recent stockholders' meeting.

Instead, all officers and directors of the stockholders' meeting were elected. The meeting also gave the management, headed by President G. T. Bailey, a vote of confidence.

Shortly before the meeting, Bailey used a statement announcing CAA's probe. He said that despite the unexpected action, Northwest's management will continue to provide dependable service to the public and protect the interests of the investors in its accounts.

► **Effect of Probe**—The company believes that reorganization of the industry in such proceedings will destroy the ability of the industry to run credit and maintain high standards in enforcing safety recommendations. The Board's recent decision to investigate the airline industry, which only some months ago CAA had rejected Northwest's request to include Washington, Baltimore and Richmond, NAL has consistently been one of the carrier's most vocal critics. The carrier, which is a member of the industry, has many other facilities. Baker declared





## New Copters: U. S. and U. K.

Unfettered interest in helicopters, both civil and military, is evidenced by these designs which are either in development or test stage. They range in size from transport to personal types, in power from reciprocating to turbojet engines.

### PIASECKI (U. S.)

The Morton, Pa., builder of the Navy's HH-34 Jockey is developing this new light transport for the Air Force. Designated the XH-16, it will be about the size of a C-54 and is designed to have a longer range than any helicopter yet built.



### BELL (U. S.)

Flight testing is underway on the Niagara Falls Company's XH-13 two-person Bristlecopter, one of which has been ordered by the Air Force. The model follows in general design the HH-13, of which one is being built by Bell for the armed forces. The XH-13 is powered by a 275 hp. Continental engine, has a top speed of more than 180 mph, service ceiling of 20,000 ft., and a combat radius of 100 mi. Gross weight is 2500 lb.



### MARQUARDT (U. S.)

First photo of the experimental prototype helicopter of Marquardt Aircraft Co., Van Nuys, Calif., shows the craft in hovering flight. It carries two 400-hp. Marquardt engines at either side. Engineers claim that it is the "first known" prototype powered helicopter. Specifications give a 1000-lb. gross weight, 20 ft. rotor disc and wood-aluminum rotor blades using NACA airfoil. The rotor has a 1000-lb. rotor disc. Performance data still extensive at this time, assembly being performed by the Marquardt company of San Francisco plant.



### GVERA (BRITISH)

The Gverva Helicopter was chosen for the first time by the Corps of Engineers Co. at the Society of British Aircraft Constructors as a model. While designed along the same lines as the Bell Model 47, the big difference is in weight. The Gverva, Britain's first light helicopter, weighs but 1120 lb. Designated the W. 14, it is powered by a 100 hp. engine. Rotor diameter is 29 ft., length 14 ft. 7 in., disc area 660 sq. ft., empty weight 550 lb., cruising speed 75 mph, range 180 mi. Designs data were obtained from the Gverva Corp. research helicopter using jet jet engine control.

## PRODUCTION

### B-47 Job Goes to B-29 Plant

Boeing's Wichita facility, top wartime producer of Superforts, restaffs and re-equips for Stratofort.

The plant and the team that won the first and largest production of B-29s have gone back into the bomber business to turn out the Superfort's successor, the Boeing B-47 Stratojet.

Decant for four years, and only for soil strength, Boeing Airplane Co.'s Wichita Plant II was reopened last spring to modify B-29s. Now the Air Force has decided to put the B-47 production program in the huge white buildings adjoining Wichita Municipal Airport. Last week the orders of wartime management and production personnel were returning to the plant.

Harold Olson, wartime production manager at Wichita, was the first to take over the job of factory superintendent. With him was to be Earl Hoffman, superintendent of production engineering in the B-29 days, now the new Plant II production manager. Both had left Kansas only in 1947 after Boeing scrapped its plans to build a bomber transport in Plant I.

Boeing's and from Wichita and its surrounding farm towns, workers who had not been inside the 2,900,000 sq. ft. plant since it closed in March, 1944, were returning to work a production force that J. E. Schaefer, Boeing-Wichita vice president then and now, estimated would number 15,000.

Initially, the Stratofort program calls for only two plants. But more may be added. At first, however, no new wings will be built close to a hard job. Yet, acceleration must be given to expansion of resources.

A checked Alaska Airlines C-46 has flown copies of engineering and production drawings from Seattle to Wichita in a few weeks, one of the two prototype B-47s is expected to be flown in, for technical maintenance by engineering and production personnel.

Planning Conference—Another sign of life at the big plant was the recent conference there of Air Materiel Command officers and Boeing executives to plan production, industrial mobilization, contracting and management. Talks concluded at Wichita, part of the group flew on to Seattle. There the top B-47 engineer—George C. Martin, newly named as chief project engineer—J. E. Schaefer, Robert L. Pirth, Albert H. Wulber and Robert M. Robbins—all participated

the project from a distance.

Plant II has been stirring since the B-29 modification job started last March. Some workers were called back, tools were hoisted into place and some of the original B-29s produced at Wichita once again began moving along the line in the way box cars of the 1,711,000 sq. ft. mass building. By mid-August about 400 modified Superforts were back in service. There were roughly 1500 more to go.

How long it will take to run through the B-29 program is the Air Force's and Boeing's secret, but with the long-range production job also on the B-47, it is certain that before Plant II is ready to go into heavy production on the upcoming jet bomber the B-29s will be out of the way.

Employment Rate—Boeing at this

time doesn't anticipate much trouble in obtaining the employees to carry out Plant II's new assignment. In March, when the decision was made to put the modification program in the plant, Boeing placed an ad in a Saturday evening paper asking for 1000 qualified aviators. On Monday about 1500 job seekers lined up at the employment office. By Tuesday, most had been recruited from nearby army bases, from Canada and Cuba. On Wednesday, a contingent arrived from Guam.

Facing the workers in the new program is the tremendous record of Plant II in wartime. It was given the job of starting B-29 production, rising at the top in manufacturing the largest combat plane ever put into quantity production up to that time, and also handling the metal modifications demanded by battle experience. The plant still turned out more B-29s than any other 1944 at a total of 3774.

### IAS Builds in San Diego

Construction has begun on a building to house the San Diego, Calif., zone of the Institute of the Aeronautical Sciences.

The structure will contain 12,000 sq. ft. of floor space and include an auditorium, library, lecture room, kitchen and dining room, lounge, stage and



### OFF TO WORK THEY GO AT BOEING

This crowd at the gates of the Seattle plant of Boeing Airplane Co. swelled on the day after the strike ended when the company told the strikers not to return to work until they were called, and the Army-Michigan union told all its members to return to the plant. Only 1960 who had been given assignments went to work with the consent of the others were assigned. Although all the strikers are being

assigned as quickly as possible, Boeing's labor troubles continue. The company has been cited by the National Labor Relations Board on two more counts: the Aero-Michigan claim that it asked the "Yonkers" Union to accept employment "before the picket line", and previous claim the company has refused to reinstate them unless "each would submit to a 'good-guy' test" since they would not work picket lines.

Activity	Personal Type	Transport Type	Military	Total
	Value	Value	Value	Value
January	447	87	147	681
February	447	114	147	708
March	447	114	147	708
April	447	114	147	708
May	447	114	147	708
June	447	114	147	708
July	447	114	147	708
August	447	114	147	708
September	447	114	147	708
October	447	114	147	708
November	447	114	147	708
December	447	114	147	708
Total	5,364	1,374	1,791	8,529

2008-2009	2008-2009		2009-2010		2010-2011		2011-2012	
	Month	Cost	Value	Month	Cost	Value	Month	Cost
January	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000
February	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000
March	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000
April	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000
May	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000
June	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000
July	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000
August	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000
September	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000
October	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000
November	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000
December	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000	1000	\$ 1,000,000
Total	10000	\$ 10,000,000	10000	\$ 10,000,000	10000	\$ 10,000,000	10000	\$ 10,000,000

\* Does not include value of military equipment lost or value of equipment and personnel.

Component	Actual		Desired	
	No.	Value	No.	Value
Personnel	14	\$220,000	60	\$45,410,000
Buildings	1	100,000	10	1,000,000
Equipment	1	1,000,000	70	1,000,000
Materials	170	700,000	10	5,000,000
Engineering & Research	20	10,000,000	10	1,000,000
Facilities	6	60,000	11	1,000,000
Logistics	1	100,000	10	1,000,000
Other	120	200,000	22	2,000,000
Utilities			1	1,000,000
Transport	11	1,100,000	10	1,000,000
Security	10	1,000,000	10	1,000,000
Unallocated	17	17,000,000	10	1,000,000
Power Engineering	50	5,000,000	10	1,000,000
Total	506	\$44,000,000	244	\$44,000,000

*Figure 14 is provided by: Ansoni Path down Ansonia*

Less, Inc., Grand Rapids, Mich., elected William F. Less to the newly created post of chairman of the board and Richard M. Mehl, as president. Less was also confirmed as director. Less has been active in the areas of research and development for the electrical and radio equipment manufacturing firm.

Mehl has been executive vice president of the company since June, 1983. Upon his present election, the office of executive vice president has been eliminated. Less, who has been president of the firm since its inception, has been freed from administrative duties to devote his time to technical development of wireless radio, automotive flight control and low modulus modulus.

**Back to Back's** President, Indulgence Inc., Cleveland-based Kenneth C. Donati, president, and chairman of the board. The latter position is now occupied by Donald W. Hill, the partner in the president's former Hill & Associates Cleveland-based business engineering firm.

**Chuck Youngblood**, former state legislator, former U.S. House minority whip, and now a lobbyist in the health government and voluntary care issue divisions. He was formerly assistant manager of the Minnesota Daily News.

[illegible]

AC Spark Plug division of General Motors Corp. has been awarded an Air Force contract aggregating more than \$21 million for new type breathing apparatus computers.

The computer was developed by Space Systems Co. and the AC contract is believed to be smaller than other government orders already awarded for the computer.

The plant is a 32-ft-tall, 400,000-sq-ft plant at Milwaukee, Wis., which was operated by A. G. Smith during the war. The plant will be used also to produce part of a \$13,380,000 Air Force order for the new gas, bomb- and rocket-gyro computer sights developed at Massachusetts Institute of Technology.

Aircraft and aircraft engine output, along with exports of engines, parts and complete planes, showed marked declines in July, according to the monthly report by the Bureau of the Census and the Civil Aeronautics Administration.

Measured by airframe weight, aircraft output for July was 22 percent below figure for the previous month. Airframe weight for July was 3,759,500 lb., compared with the June figure of 4,200,500 lb.

A total 1189 aircraft were shipped during July, of which 920 were civil types and 199 military aircraft. Civil type shipments were valued at \$9.5 million, a drop of 4 percent to number and 43 percent in value from June figure of 499 aircraft valued at \$55.3 million.

Military aircraft shipments accounted for 70 percent of airplane weight for July, personal type civil aircraft 19 percent, and transport type civil aircraft, 11 percent.

• **Engines Drop**—Total value of jet aircraft engines and parts shipped during July was \$1.2 million, a 64 percent decline from the \$3.4 million shipped during the previous month.

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For Engines By Type	Rated Horsepower	Weight	Price	
1800 cc. in. dia.	15 h.p. DC	18 lbs.	\$27	
1800 cc. in. dia.	24 h.p. DC	30 lbs.	\$52	
2000 cc. in. dia.	12 h.p. DC	27 lbs.	\$47.00	
2000 cc. in. dia.	24 h.p. DC	37 lbs.	\$60.00	
2400 cc. in. dia.	24 h.p. DC	28.75 lbs.	\$58.00*	
2400 cc. in. dia.	116/200, 1 phase	400 cycles 25.00 lbs.	\$124.00*	

\*The engine (for its rated) runs at 2,100.

JET ENGINES				
Starting H.P.	Rated Horsepower	Weight	Price	
10	15	24 h.p. DC	\$27.75 lbs.	\$108
11.5	24	24 h.p. DC	27.75 lbs.	\$124

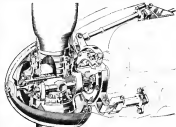
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RETISH propeller de Havilland (left) for 75-125 hp. and Rotol (right) for 100-125 hp. are manually controlled, variable pitch units.



FRENCH H. H. H. "H. H. H." designed for 70-125 hp., is similar to U. S. Aeronautics.

## Foreign Lightplane Props Analyzed

Design trends in postwar development abroad favor both automatic and manually controlled pitch change.

By Robert H. Fries\*

Personal inspection of new European propellers for lightplanes has disclosed some interesting design features, particularly the pitch-changing mechanism.

In Britain, I was shown the de Havilland and Rotol light propellers, both of which had emerged from the exper-

imental stage. Although the British had small automatic and constant speed units under development before the war, both of the types now in use are manually controlled.

► **de Havilland Prop**—The de Havilland firm believes that manual variation of pitch is necessary for both lightness and simplicity. (Maintaining a weight of 10 lb. and an extremely simple system, the propeller may not achieve these aims.) Design of the de Havilland propeller

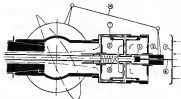
was completed and flight tests on a Moth Minor (59-hp. Cooper Motor) were just beginning when the war put an end to normal development. However, the Moth Minor continued as service as a cross-country airplane, and the propeller took about that time to be controlled through the six war years which followed.

It proved satisfactory to critical pilots and, despite exposure to all weather, proved completely trouble-free maintenance was.

This manually variable-pitch propeller is a departure from standard de Havilland practice in that wooden blades are employed and the hub consists of only one major component, the barrel, designed to carry the combined torque, thrust and centrifugal loads. It is splined internally to fit the engine shaft.

The blades, fitted with a means for manual indexing to a basic pitch angle, are mounted in the barrel with ball joints of special design, and are released by eleven pins whose locking is effected by the pins which also lock the propeller retaining nut.

► **Flow Pitch Changed**—Pitch of the blades is changed by a small photoelectric transducer which, through a flexible shaft, actuates a piston port in a line on the engine nose immediately behind the propeller. By a nut and screw-thread mechanism one end of a bellows is secured axially to the propeller shaft, and from the other end (which rotates with the propeller) links attached to the blade roots alter the pitch.



**SWEDEN:** Operational diagram (left) and exterior (right) of Malmövarvs Aeris prop for 180/193 hp. Dynamic pressure of air on forward disk effects automatic pitch variation

Since the return gear is irreversible, the blades lock whenever they are left going at infinite velocity of fixed pitch, within the range between high and low pitch stops.

On French Potez-A de Havilland seven propeller was sent to France and installed on a S.N.C.A. de Reel E-1E 2300, which is a two or three-cylinder, low-speed monoplane (single line) with a Renault 47-81 engine of 341 hp; takeoff at 2400 rpm. It has an all-up weight of 2200 lb., top speed of 150 mph and cruising speed of 200 mph. Comparative tests were conducted with the Renault and showed a 20 to 25 percent reduction in takeoff run, a cut of climb speed of nearly 20 percent in tests conducted from sea level to 16,000 ft., and a gain in time to 16,000 ft. of 35 percent.

Swedish designers feel this would be less than 7 ft.

For two-engine installations, a small, two- or four-cylinder electric motor is being developed which will synchronize propeller pitch change.

**Ratier Details:** The Ratier manually controlled propeller now designed for engines of from 180 to 150 hp. Propeller alone weighs 47 lb., and electrical controls weigh 11 lb. more. The electrical equipment is made available per engine for two-engine applications, where it provides 12-volt. Initiating and speed pitch change by depressing the cockpit control button.

Mechanism for changing pitch consists of links (attached to the blade roots) connected to a transfer bearing which is actuated by direct manual or electrical control.

The operating links are connected to the blade roots by pins welding in place bearings, and are purchased from Ratier in the hub. They have a counterbalancing movement when pitch is being changed, hence once the operating pins to move radially achieve to

the blade root. The rear ends of the links are attached to the inner member of the transfer bearing located at the rear of the hub.

**Swedish Operation:** The housing is rotated by a lever which operates it. Lever end of the housing is attached to a non-rotary bracket in a hollow, while its upper end is connected to a sprocket which moves the lever to obtain the desired pitch allocation.

The return spring is a coiled, spiral-action actuator fitted with a reduction gear at its fixed end. Pinion of the reduction gear is driven by a flexible shaft from the fixed bearing gear controlled by the pilot.

Thus the general scheme of pitch control is that the screwjack pulls, as pushes, the upper end of the actuating lever. This moves radially on its ball race and causes the transfer bearing housing to which the operating links are attached, to turn the operating pins radially, changing the pitch of the blades.

**French Ratier Prop:** Long the name of model small, airplane designs, French now has but one new propeller, and this does not appear to be entirely original. It is a bulk, automatic type built in Ratier, the largest French propeller firm.

Designed for 70 to 125 hp engines, the Ratier prop features solid metal blades incorporating a lag angle and counterweights clamped around the blade shanks. Thrust (moment) obtained by the lag angle rotates the blades to low pitch at low of high thrust, and the counterweights balance thrust and move the blades to high pitch as thrust decreases.

Weight of the propeller, designated Aeromac, is 55 lb. Cost is over \$700. Recent tests with the French Navacas sport plane show that the Aeromac propeller maintains better constant speed control of the engine and pro-



duce higher performance figures than the Aeromac on the same ship. Top speed results with the two propellers were similar.

**Sweden's Contribution:** One of the most unusual postwar European propellers is the "Dynamac" designed and produced by Malmövarvs Aero A-18 of Norrby, Sweden.

Operation of the propeller is controlled with reference to the aerodynamic section diagram. Movement to adjust the blades is obtained from a servomotor, located on a forward cutout of the propeller shaft, consisting of a cylinder (1), lower piston (2) connected via a lever (3) to two rods (4) attached to the propeller blades. When the piston moves backward or forward in the cylinder, the propeller blades are twisted to a smaller or greater angle.

A regulating piston (5) within the lower piston is connected via rod (6) to a circular air disk (7) located at a recess in the side of the propeller. Rear side of the lower piston is connected to a spiral regulator spring (8), air end of which acts against a fixed point in the hub.

Lubricating oil under normal operating pressure serves as the power source for the movement of the lower piston.

The air disk is responsible for the automatic pitch variation through action of the dynamic pressure of the air. When stationary ground conditions or at low speed, this pressure is small and the regulator spring forces the piston with its air disk to its most forward position, corresponding to a small blade angle. At high speed the pressure of the air on the disk becomes larger and the regulator piston is forced back, causing the lower piston to follow through the action of the oil, turning the blades to a greater angle.

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a few ounces to about two pounds and depends mostly on the regulator spring, which always tends to pass the piston forward. However, the lower piston follows the regulator with a force of about 200 lb.

As the variable-pitch characteristics of the "Dynamax" are partly dependent on the properties of the regulator spring, trimming of the propeller is quite simple. By using different sized springs the propeller can, for example, be made to operate in one of the following ways:

- Two positions, takeoff and cruise.
- Three positions, takeoff, climb, and cruise, with continuous adjustment between climb and cruise positions.
- Control speed with a large range of variation.

Other combinations can also be obtained.

Weight of the propeller for an engine of 108 to 150 hp is 46 to 44 lb. The high weight to horsepower relationship is probably because of the heavy hub and blade retaining device.

The wooden blades are composed of alternate laminations of different woods.

Although the "Dynamax" features a novel combination of components, most is essentially new. A Frisch Kabin propeller of 1934 employed an arrangement, as an example, plate, to allow the control rod in a piston-type lag and permit a spring to effect pitch change.

## Jet Fuel Spray Angle Measured by Impeller

A nozzle-impeller indicator for jet fuels, an essential device for connecting combustion chamber distribution distributors, has been developed by the control unit, Power Plant Laboratory, Jet National Research. It is one of the jet engine overhaul base of the Oklahoma City Air Force Depot.

Angle of the fuel spray has an important bearing on the extent of fuel entering within combustion chamber and, hence, on thrust performance.

A small impeller wheel, mounted on a 1/4-in. dia. shaft, is inserted in the lower end of a spray chamber, opposite to the nozzle. As the impeller is rotated toward the incoming spray, it begins to move. The moment it moves the index in the spray angle.

Angle indicators are shown on a 16-in. diameter wheel mounted by a lever to the impeller.

The new device is designed to measure spray angle to within 2 deg., as necessary needs greater than past previous methods.

The chamber angle spray provides spray pressure from 10 to 300 psi.

## Guided Missile Heat Is Problem

Temperatures present material and structural considerations which indicate the advantage of night firings.

By Robert McLarren

The outer space atomic rocket traveling at hypersonic speed may have to be launched at night if water heat is not to cause it to disintegrate.

While missile speeds of 25,000 mph, and altitudes of 1,000,000 ft may seem fantastic to the layman, positions as heated as such operations now occupy much of the thought of the U. S. Air Force. This is especially true since eye observation by Russian Air Force officers and aircraft.

The heating effect of high-altitude speed is obviously well-known, and modern jet fighters are equipped with cockpit refrigeration as standard equipment.

For example, the Lockheed F-4E, Republic F-4D and the Boeing X-47 at top speed experience a temperature rise of 170°F above sea level temperature, which may bring cockpit temperatures as high as 170°F. As engine heat, will also contribute and dangerously raise the level of human endurance. Effect of higher Mach numbers on skin temperatures is shown in Fig. 1.

► Temperature variations in the atmosphere are made larger to climb, have one, a large number of factors become increasingly complex.

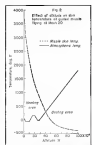
First of these is the ambient air temperature, which drops off rapidly with altitude and is usually —47°F at 35,312 ft, under standard atmospheric conditions. The cockpit of the jet fighter or bomber would have cooled to only 15°F, and heat would be required for comfort.

Then —47°F temperature remains approximately constant up to about 30,000 ft, at which point the atmosphere grows still and begins to increase its temperature until it reaches 170°F at about 145,000 ft.

After ascending at this rate to nearly 200,000 ft, it again reverses itself and tends to grow cold, the temperature dropping below —25°F, continuing so to about 273,000 ft. Then it begins a climb and it reaches 215°F at about 400,000 ft, the highest altitude for which it has been officially calculated.

At higher altitudes the temperature continues to increase indefinitely, until that of the sun is approached.

► Density Changes—Meanwhile, however, as the altitude has increased, the density has steadily decreased from 0.002373 slugs per cu ft. at sea level to 0.0000131 at 300,000 ft, 0.0000007 at 400,000 ft, 0.00000035 at 500,000 ft.



and 3.00000000 at 400,000 ft.

These extremely low densities qualify the atmosphere at these altitudes as a vacuum, and, as such, the more heat path of the molecules becomes of considerable importance.

For example, at sea level the mean free path is 8.90000015 in. and the atmosphere is dense, considered a continuous state. However, as the density decreases the mean free path increases to 0.00037 in. at 100,000 ft, 0.011 in. at 200,000 ft, 0.1 in. at 300,000 ft, 1.0 ft. at 400,000 ft, and 36 ft. at 500,000 ft.

In other words, at an altitude of less than 100 m, the molecules of air are more than 36 ft. apart, indicating the



## A Navy Champion

### The Lockheed P2V Patrol Bomber

In its fleet of Lockheed P2V Patrol Bombers, the U. S. Navy possesses the longest range aircraft in the world.\* The Lockheed P2V gives the Navy long distance sight and security—endless, swift, reliable. Lockheed Aircraft Corporation, builder of the Navy's P2V, takes the occasion of Navy Day, October 27, to salute the men of the Navy at sea, on land, and in the air.

### Your Navy—Victor in War. Guardians in Peace

\*The U. S. Navy拥有 Lockheed P2V Patrol Bomber, holds the world's official record for nonstop long distance flight—13,236 miles

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extremely low density permitting only a short distance from the earth.  
► **Equation Specified**—Heat generated in the skin of the missile by its passage through the air is dependent on the number of molecules of air it encounters at a given altitude and speed. This number may be determined from the equation

$$n = \frac{87V_a}{2V_m} \left[ \frac{1}{V_m} \frac{dV}{dt} + \frac{1}{V_m} \frac{dV}{dt} \right] \quad (2)$$

in which  $n$ , is a number of molecules striking each  $N$ , number of molecules per unit volume of gas,  $V_m$ , is the probable molecular speed in ft/sec,  $V_a$ , is the actual velocity in ft/sec,  $\theta$ , is the angle of incidence in deg, and  $d$ , is the distance in ft.

For rough calculation, the term within the braces (molecule head-on) may be taken as 4 for a value of  $\frac{d}{V_m}$  and  $\theta$  of 45°, for a value of 2, and 14 for a value of 4.

Amount of energy of the molecules striking the body can be determined from the equation

$$E_s = 3nRT \quad (3)$$

in which  $E_s$ , is in ft. lb. per sq. ft.,  $n$ , is determined from Eq. (2),  $R$ , is 5.66 x 10<sup>-8</sup> ft. lb. per deg. F. per molecule; and  $T$  is the temperature in deg. F.

Amount of energy radiated by the missile may be determined by the equation

$$E_r = (E_s + nRT) (1 - \alpha) \frac{S}{4\pi r^2} \quad (4)$$

in which  $E_r$ , is in ft. lb. per sq. ft.,  $E_s$ , is determined from Eq. (3),  $n$ , is determined from Eq. (2),  $T$ , temperature of the molecules,  $\alpha$ , equal to  $(E_r - E_s)/(E_r - E_s)$  (in which  $E_r$ , is energy of the molecules at this temperature, and  $E_s$ , is energy of incident molecules in ft. lb. per sq. ft.), and  $L$ , is the temperature.

► **Star Temperature**—From these equations, a series of calculations indicate that in a night flight at an altitude of 40,000 ft. and a missile speed of Mach number 30, the star temperature will be 340° F., or 120 deg. hotter than the ambient air.\*

As the altitude is increased to 52,000 ft. however, the star temperature drops to -60° F., or 50 deg. colder than the ambient air (Fig. 2).

This remarkable difference is created by the substantial increase in the molecular mean free path and the consequent decrease in collision from the ambient air. The paramount importance of missile stability and accurate guidance is revealed in the fact that should the missile slow to little as 5 deg. the trajectory under the above conditions

would increase to 740 F. and 40 F., respectively.

At higher altitudes, skin temperature continues to decrease, dropping to -230° F. at 125 mi., to -340° F. at 150 mi., and -410° F. at 180 mi. altitude. When it is considered that the ambient temperature at these altitudes is 923, 1273 and 1510° F., respectively, the tremendous heat resistance of the upper skin is made graphically revealed.

Flight during the day presents a considerably different picture, however, with the missile skin attaining a temperature of 900° F. at an altitude of 75 mi. and 750° F. at 150 mi.

► **Night Time Advantage**—These data indicate that in direct contrast to high speed flight in the lower stratosphere, which generates enough friction heat to actually recombine the without of the V-2 missile, flight in the upper stratosphere and mesosphere at hypersonic speed are subjected to substantially lower temperatures.

During operations in solar radiation, however, solar flux temperatures are high enough to present materials and structural problems indicating the advantages of night time of missiles.

Since aerodynamic problems disappear at the extreme altitudes in which there exists no atmosphere, missile thrust can be determined on the basis of thermodynamic requirements.

Since positive angles presented in the maximum possible extreme heat, it follows that the missile body should incorporate as much negative angle surface as possible. This can be attained by placing the maximum cross section far forward followed by a gently sloping afterbody.

These data also indicate the practical importance of thermal contact between all portions of the missile so that the least temperature of the attached can radiate much of the heat absorbed by the low area. The economy of the data must be made as high as possible, opening a new field of metallurgical and structural research.

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### Increases Airplane Reliability

Do winter storms ever menace of halting your trip plans? Depend on the possible equipment handling, during strong winds, and other winter storming conditions, will add new flying pleasure and valuable reliability for your winter flying.

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Running roughshod, bumps and bruises are no hindrance in airplane operation as a business necessity when shown that it is reliable, convenient, and safe under all conditions.

On the businessman's or sportsman's airplane, that's essential. Landed, stopped, then they have no airplane will automatically safety and decrease the possibility of accidents at present or in the future and reduce air travel time.

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Don't let snow and winter flying stop you. Run through your plane with all metal wheels during heavy snow or sleet. Skidplane winter flying without stopping at airports, private airports, business centers, suburban field airports, etc. where you can land anytime. Economical, does double duty for skis, skis, skis, emergency deliveries.

When heavy snows or ice get in the way of transportation, you can get them with skis and skis and skis.

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There are many good flying planes in winter for airplane equipped with all metal wheels. In summer the same equipment with wheels. Skidplane winter flying without stopping at airports, private airports, business centers, suburban field airports, etc. where you can land anytime. Economical, does double duty for skis, skis, skis, emergency deliveries.

### Increases Flying Safety

Federal's new ski-on one motor. All metal ski-on one motor. All metal ski-on one motor. All metal ski-on one motor.

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**AIRCRAFT WORKS**  
MINNEAPOLIS 12, MINN.



## New Aerial "Eye" Has Ten-Mile Sight

A giant telephone lens—nearly four ft. long and 17 in. in diameter—has been produced for U. S. Air Force aerial reconnaissance.

Designed and manufactured at Eastman Kodak, a Howdy-Way Works, this large "eye" will be used with the Service's K-16 aerial camera for taking pictures on 9 x 14-in. film at altitudes up to ten miles. By employing sensitive gelatin, a huge map will be formed.

The lens is composed of five glass elements. Total length is 68 in. and total weight is 170 lb.

For high altitude operation, a theoretically controlled electron beam is used as it is built into the mount to maintain proper focus by compensating for temperature changes which would cause

the metal of the mount and camera to contract. And because this is at high altitudes results in a different order of refraction, accurate adjustment in the mount are provided to compensate for effects of variation in atmospheric pressure and also to focus the lens exactly for any distance from one to ten miles.

Less elements are covered with a microscopic coating of magnesium fluoride, by Kodak's vacuum process, to increase light transmission and to reduce flare. Interchangeable films fit into the body of the lens mount to insure the effect of atmospheric haze.

In the accompanying photo, depicting the lens mount on coast, two glass elements are visible. The circular taking is for taking pictures at high altitudes.

With present installations it requires 20 men eight hours to fuel an airplane with 7,000 gal.

Fast-operated shut-off valves installed in each tank provide this feature. Ability of the system to be filled from any point, and automatic transfer of fuel in flight at the balance of the airplane changes.

During ground fueling the valves that shut off automatically when the tank is full, showing the fuel line into an adjacent tank. Valves are electrically actuated and do not require manual power for operation.

The system operates at a normal pressure of 40 psi at the filler points which produces a flow rate of 300 gpm. The pressure can be dropped to as little as 15 psi to reduce this rate to 150 gpm. All system components are designed to function satisfactorily over a range of temperatures from -65 to 135 F.



# The Birdmen's Perch

by Major Al Williams, ADAS, "TATTERED WING SPS."  
Gulf Aviation Products Manager, Gulf Bldg., Pittsburgh 20, Pa.



We're going to start off the cartooned Little Keweenaw Puffs. Now we'll know Puffs Day, with a bang!

We had so much help (by mail) from so many people when we were questioning whether to continue the Puffs Day, that we figured we owed you all a vote of thanks.

So we're sending some extra Puffs Plus Commemorative (Puffs) along, naturally, to a bird of names that we've pulled out of our mail bag. If you missed out on one of these gift commemoratives, remember that you can still save one by sending in a Little Keweenaw Puff that's a second enough to go.

Welcome to our other little group, Edward Whelan, Cleveland, Ohio. In dedication, Mr. Al Williams to John Baker, Carroll, Ohio. Here, N.Y. And to Robert S. Kelly, Springfield, Mass.

TO GET APPROXIMATELY 75% OF THE POWER FROM YOUR ENGINE, IT'S BEST TO RUN AT 100% OF THE POWER FROM YOUR ENGINE.



Like we said, these commemoratives are free for you people—a gesture of good will, you might say. If you see one of you get to sleep tonight without crying down and seeing up a few Little Keweenaw Puffs for us, we'll be honored, scratched, and disappointed!

## TRIED IT YET?

Have you read the great new Gulf Airplane—Series D—yet?

Take our word, if it's not working values, all signs said it will stop down for a long time.

And if it gives you money, many more hours between overhauls because of its ability to clean foreign matter from its own surfaces and keep it in operation so that it takes you or not down.



NOTE: We're still getting acquainted with our new K-1 GulfBugs. We'll try to let you know more about her soon. We can tell you now that she's got a better model!

Gulf Oil Corporation and Gulf Refining Company... makers of







## J-M Thermoflex Blankets protect new Boeing XB-47 Stratojet Bomber



ABOVE: Arrows indicate Thermoflex Blankets around turbine casing of the Boeing XB-47.



BELOW: Close-up of Thermoflex Blanket showing fasteners which secure one application.

THE BOEING XB-47 is powered by six General Electric J-35 axial-flow jet engines of 4,000 lbs. thrust each. Shielding the intense heat at tail cones and around turbofans are J-M Thermoflex Blankets.

Developed by Johns-Manville especially for insulating the engine cones, turbine casings and hot pipes of jet engines, the Thermoflex Blanket combines excellent thermal properties with the light weight and

flexibility that are also essential in this service. It gives continuous, satisfactory performance against the temperatures encountered in current jet engines and its construction is such as to permit ready adaptability to future advanced designs.

Thermoflex Blankets are custom-made in thicknesses of 96" and up. The complex blanket as used on the XB-47 is 96" in thickness and averages 9 ounces per square foot in weight. Lighter weight blankets

using various types of meshes, screen cloths and foils are also available.

For further information about Thermoflex Blankets, address Johns-Manville, Box 290, N.Y. 16, N.Y.

## NEW AVIATION PRODUCTS



### Fuel Evaporation

For fuel lines and support pipes, self-priming diaphragm pumps for alcohol, light oil, and other volatile liquids are equipped with positive shut-off valve for protection against evaporation losses. Made by General Synthetic Equipment Co., 2750 W. Hawthorne St. P.O. Box 32, Pa. No. 750 pump has no pistons, rings or lathings, or rubbing parts to stick or wear. Filippop seals can be broken in mounting time, and waste is prevented by automatic dump-back, which empties bowl and pump when handle is lifted. Capacity is 15 gals.



### Records Flight-Test Data

New line of recording instrumentation use magnetic tape to store valuable as well as data under conditions of severe shock conditions for later reviewing and analysis. Built by Cook Research Labs., 1457 Sherman Place, Chicago 14, Ill., designs have such information channels, and in addition, include time base channel for speed and error compensation. Model MRA-2, with 12 information channels and recording time of 15 min. is suitable for test of engine temperature, acceleration,

stroke, etc. Model MR-5 with 6 channels, suitable for 1 min., and is applicable to partial models. MR-6 is accurate, weight-and-air, 6-channel general purpose unit with 25 min. recording time.



### High Temperature Valve

Designed for jet aircraft, lever or nonlever-operated disk valve announced by Wm. R. Whittier Co., Los Angeles, Calif., controls heated high-pressure air taken from intermediate stage of engine compressor for anti-icing, fuel tank preheating, windshield de-icing, cabin air temperature and pressure regulation, atmosphere control, etc. Special nonspalled heat-treated mating rings provide durability with leakage of less than one percent under maximum temperature and pressure ratings. Features include sliding gate and shock arrangement and optional two-speed transmission for motor-operated models permitting slow opening and quick closing of valve. Taking temperatures up to 550 F. and pressures to 125 psi., with cone in 1, 1.5, 2, 2.5, 3, 4, 5, and 6 in., port diameters.

### Small Parts Hoses

Designed for rapid, accurate fitting of aircraft cylinders, screens, connecting rods, bores, bushings, bearing housings and ball-bearing races, small size hydraulic fitting machine for use direct from 1/4 to 1/2 in., is produced by C. Allen Feltzer Co., First National Bank Bldg., Cincinnati 2, Ohio. Nine sizes make in 12 in. and recording speeds are from 0 to 50 fpm. Hydraulic power is supplied by Victor vane pump driven by 1/4 hp. motor. Spindle, 1/4 in., fits 1/8 in. spindle with No. 3 Morse taper to fit production type bearing tools, is driven by separate 1/4 hp. motor. Welded steel base contains 45 gal. of coolant delivered by 1/10 hp. Gardner motor driven pump.

### Powder Lubricant

Specially formulated dry lubricant for mechanical parts, "Dry-Lube" is claimed suitable for high, low, and room temperature. Made by Alpha Corp., Greenwich, Conn., material consists mainly of molybdenum disulfide particles which may be mixed to a paste with SAE 10 motor oil. Tests are reported to show low friction coefficient and capacity to prevent galling, scoring, or metal-to-metal contact at bearing pressures of over 100,000 psi.



### Facilitates Layouts

Standard draft drafting machine, affording convenient operation in position from horizontal to vertical, is available from Foxboro Mfg. Co., Weymouth, Mass. Drafting of angles is on convenient quadrant, allowing setting of every 3 deg. by dropping screw, adjustments as fine as 25 min. being obtained with slight turn. That is made for boards ranging from 24 to 172 in.

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300 planes and 300 people came from five states.

They never had been as accident at the field.

Vacationing guests, and each year an increasing number of them come by air in their own planes, pay \$10 per day per person for meals, drinks, the use of boats and the remarkable golf course between the Lodge and the landing field. No charge is made for the use of the airport.

## Crosswind Gear Patented

Patent No. 424,738 for a mechanical crosswind landing gear which is optionally centering and controllable from the cockpit has been allowed by the U. S. Patent Office, on application filed by Charles E. Jamieson, Moguesville, W. Va., Oct. 21, 1946.

Jamieson, a former fixed base operator, had his aviation equipment as a helper for at Moguesville in July, 1947, and currently operates an instructional service. He also has applied for additional patents on an hydraulically actuated control system for the same have removed gear, designed primarily for long transport aircraft, and a single landing gear. Controlling mechanism is in the landing gear strut.

The inventor believes that the aircraft arrangement is directly centering gear, permitting retention of centering and steerable wheels, is preferable for large aircraft.

## Oregon Decline

Decline in airport operations in Oregon was reported by the state board of aeronautics after a recent issue of the state's principal fields. Report attributed declining income to Wisconsin Administration restrictions cutting off GE flight training, and public loss of two airplanes involved by two recent small plane crashes involving passengers. Oregon says, despite a general safety report in the state which is "actually remarkable," Chairman Ben Kullback stated.

Examples of closed operations cited at the airport at Astoria, Klamath Falls, and Tillamook there is now only one small plane operation each city. Recently there were two at Astoria, four at Klamath Falls and five at Tillamook.

## New Manual

New edition of the CAA flight is becoming manual, containing 230 pages of data for pilots, now is available for \$1 from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Two new chapters on weather service for pilots, and the air route log are included. Manual lists all U. S. airports, address, range station location, and nearest communication station.

## BRIEFING FOR DEALERS & DISTRIBUTORS

**BRITISH DEMONSTRATIONS**—Two of the most interesting American experimental developments in the personal aircraft field, Dick Fulton's Alptrophus autolap and Eleanor Forrester's baby helicopter, the Hapacopter, went to England recently. Fulton took his detachable automobile-engine system this summer for a demonstration under the sponsorship of a British newspaper and just got it back in time for his appearance at the National Air Show.

Forrester is currently reported to be making demonstrations under auspices of the British Ministry of Supply. His one-man "flying tripod" is still in experimental status, but he is looking forward to possible production next year.

Fulton, as previously reported, is winding up his CAA certification requirements on his experimental Alptrophus No. 2 and is also considering small scale production next spring.

**INJECT AIR CONDITIONER**—An experimental air conditioning unit for the Beech Bonanza which works on the water evaporation principle is being tested. The unit is still in early stages and Beech has made no decision about its future use on production models. It fits into the cabin roof of the Bonanza.

**NEWS FROM LUSCOMBE**—Add to the long list of Luscombe models the new Silver Caposparty which is planned as a modification of the bubble canopy tandem Observer. The aircraft design will be powered with a 70 hp. Continental engine, will have a stalling speed below 40 mph, together with unusual maneuverability, rate and angle of climb. The manufacturer states it is to be ready for delivery in time for spring test flying.

Special spray tanks will be designed into the airplane, and Luscombe engineers are trying to make the airplane so that it can be used effectively as a standard commercial insecticide after removal of spray equipment. Two professional aircraft spray operators have already flown an experimental version of the Caposparty without any equipment, and have praised its performance, the manufacturer states.

**EFFICIENCY REGATTA**—Approximately 100 personal type airplanes are expected to enter class competitions of the fall airport at Wings Field, Aukley, Pa., Oct. 18. Competition begins at some but all competing airplanes are expected to be in the field the day before. Five or six aircraft in each of the following stock model classes are expected: Cessna 140 and 138, Beech Bonanza, Beechcraft D-18, Bellman, Es-rocket, Navion, Stinson, Piper PA-18s, Luscombe, Antonov, Spaul and first reconnaissance will be determining factors in picking the winners. A triumph cross-country course will be flown for two laps with a total distance of approximately 180 miles.

**ANDERSON AT MADISON**—Anderson Air Activities, Milwaukee, has announced purchase of Healy Flying Service at Trout Field, Madison, Wis. E. Merritt Anderson, head of the Milwaukee fixed base operations says his new Madison service includes a lease on the modern hangar occupied by Healy, and the gasoline concession for the field, here the city of Madison.

The field, originally known as Madison Municipal Airport, was expanded into a Class V airport by the Army during World War II. Now Anderson has many other opportunities for developing a college flight training program in conjunction with University of Wisconsin. Anderson operated a basic training school for Air Force cadets at McPherson, Mo., during World War II, where students flew 78,000 hours without a crash injury or fatality.

He returned to his present operation at Milwaukee at war's end and was an outstanding record in a training school operator and has been the best known and probably the largest aircraft dealer and training operator in Wisconsin since.

**65-ON WAY OUT**—William T. Papp, Sr., has been telling his friends that the improved performance of the 65 hp. Piper Cub is such that his company plans to drop manufacture of the 65 hp. Cub very soon and concentrate exclusively on the higher horsepower two-seater and the Family Cruiser.

ALEXANDER McSURELY





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Prompt deliveries are a consistent feature of

Kohler service. This is made possible by the fact that Kohler maintains full facilities for casting brass and aluminum, forging, machining, plating and anodizing. There are many types and sizes in the Kohler precision parts line—and if you have special requirements Kohler engineers will cooperate, as they have done many times, in developing specially designed valves or fittings. Kohler quality is a 75-year-old tradition. Write for a copy of Catalog L, Kohler Co., Kohler, Wisconsin. Established 1873.

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Flying a modern traffic circuit is teamwork; each member of the crew pulls his weight. External conditions on a flight sometimes change as rapidly as the photoreception on a screen. At such times there must be swift communication among the members of the crew. If every piece of information is to be coordinated in to a unified picture for the pilot's guidance, he back from the entire crew also grouped in the pilot's compartment, talk is unhampered, and every observation can be reported as it is being made. The crew of four functions as one man — an exceptional safety factor.

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## AIR TRANSPORT

### Radar Grows as Weather Weapon

Greater role in approaching winter indicated by new developments; unit prices go down as orders go up.

An increasingly important role for radar in the post-war military and civil aviation is the problem of all-weather flying in the air and in the air. The increasing use of radar in the air and in the air is the key to the problem of all-weather flying.

Following are significant developments:

• Civil Aeronautics Administration is preparing to buy an additional 33 airport search radar sets and another 20 precision beam approach radar sets (GCA).

• An Transport Association officially approved GCA as a "mandatory approach procedure" and urged member airlines to file for CAA approval of GCA as a primary aid weather approach method at Chicago, New York and Washington.

• Production contract for a new airport traffic control radar (CFP-13) was awarded Radio Radio division in the U.S. Air Force.

• TWA became the first domestic airline to get CAA approval for use of GCA as a primary aid weather approach at its Washington, D.C., base for both passenger cargo and letter flights. CAA approval as initial indication of 180 ft. in ceiling and one-quarter mile in visibility under current weather minimums when GCA is used.

A similar reduction was approved for every six months of operational use to 180 ft. in ceiling and one-quarter mile in visibility under current weather minimums when GCA is used. Four U.S. international carriers have received CAA approval to use GCA at their foreign airports with a similar reduction of weather minimums. These are Pan American, TWA and American Overseas at London; New York and London; Northwest Airlines at Spokane, Alaska, and Alaska and Pan American at London.

Acceleration of the airport radar program as used in the RTCA SC-30 report and initiated by the CAA has spurred further manufacturer competition for the 18 radar sets now on the building. In addition to GE/RCA, Boeing of Los Angeles and Bendix Radio division of Bendix, principal contractors, for the initial CAA radar bids, Westinghouse, General Electric and Philips Telephone and Radio Corp. are bidding for the new contracts. CAA

will open the bids Nov. 23.

CAA indicated that with the expansion of the airport radar program out of individual units would show a startling decline. In dropping one its purchase from a single set to eight CAA last year reduced cost of the search radar to \$169,524 and precision beam approach radar to \$97,227. This represents a decline of \$164,514 for the search and \$173,276 for the precision over a single set order.

• Comparative Costs—These figures indicate that the cost of airport radar is coming into line with that of the VHF radio beam approach system (RBS) now installed at some 60 U.S. airports. In quantities of 45, a complete U.S. installation including marker beacons, monitoring systems and standby equipment now costs \$121,117. The RBS is comparable in function to the radar precision beam set. Search radar is required for air traffic control regardless of whether ILS or precision radar is used in the final approach system.

Delicious of the current airport radar set, an order from GE/RCA has been

included to begin next March with installations scheduled for next year as follows: Los Angeles, April 15; Washington, May 15; New York, Sept. 15; Chicago, Oct. 15; Atlanta, Nov. 15; St. Louis, Dec. 15 and Boston, Jan. 15, 1950. Military surplus equipment now at Chicago, New York and Washington will be replaced by new civil airport models.

• GCA Schedule—All precision beam radar sets and 20 of the 30 search radar sets now under bid are scheduled for installation at the following airports: Houston, Portland, Ore.; Kansas City, Cincinnati, Jacksonville, Denver, San Francisco, Pittsburgh, Detroit, Seattle, Newark, New Orleans, Salt Lake City, Indianapolis, Philadelphia, Memphis, Minneapolis, St. Louis, and Anchorage and Fairbanks, Alaska.

In putting its approval on GCA as a search approach method, the Air Transport Association wants its member airlines that unless they begin to use GCA broadly they will have little voice in the future use of GCA and in determining operational procedures under which it will be used.

• ATA Recommendation—In a bulletin to member airlines, Milton W. Arnold, ATA vice president for operations and engineering, recommended that the airlines officially recognize GCA as an acceptable primary approach procedure where desired, in order that the airlines may have a voice in planning its future. Arnold said that final use of GCA would "open of great value in the airfield at the present time, for example if for some reason the ILS were inoperative."



IATA EXECUTIVES AT BRUSSELS

Two presidents of the International Air Transport Association met with Director General Sir William F. Hildreth, center, at the close of the world airline organization's annual fourth annual general meeting at Brussels (London World, Sept. 27). They are Gilbert Prew, first president of the Belgian airline, Sabena, and current president

of IATA, and Dr. Albert Prew, president of KLM Royal Dutch Airlines, seated at Brussels to take office when IATA holds its next annual meeting at The Hague in 1949. Next year's meeting will mark the 10th anniversary of the founding of both IATA and IATA's predecessor, the International Air Traffic Association.

Amold recommended that all airlines along Chicago, New York and Washington file an additional form 511 with the CAA requesting approval for an additional approach. "Based primarily on the use of CCA, carriers naturally on a per se basis to formally file an ILS approach at these fields with a request that they be monitored by CCA," Farnat application by Delta and the Civil Aeronautics Board told the flight operations division of CAA to adopt a definite position with regard to CCA and the scheduled airlines, Arnold pointed out.

•**Farnat.** The FAA's present scheduled airline use of CCA at modified altitude limits to accommodate operations. The new, with-altitude elements of Canada, Shannon, London and Paris are all approved, says CCA. Anticipated language differences with international use of CCA have so far failed to materialize. Recently at London Airport a British CCA run continuing as English successfully landed first time. Instructions of the Irish Air League, Belgium Airlines, Dutch KLM, Air France and BOAC.

Henry has made a case ending with only 100 ft. visibility during three long legs. Both normal and control flying routes to the Grand have CCA at their own levels. On the northern route, Edinburgh, Edinburgh, New, Asheville, Savannah, Atlanta, Tokyo, Okinawa and Shanghai have modified CCA use.

Total of 165 CCA sets are now in operation, with 70 in the continental U. S.

## Certificate Ordered

By direct order of President Truman, Pan American Airways last week became the second carrier to be certificated for the Pacific Northwest Alaska route—a link which a CAB examiner and certified two little initial potential to support even one operator without high subsidies.

Northeast Airlines late in July was given a three-year certificate to fly from Seattle, Tacoma, Vancouver and Portland, Ore., to Honolulu. CAB's new regulatory options (give PNA authority to operate between the main route, but Pan American is prohibited from making directly shuttle flights between the Pacific Northwest and Honolulu. At PNA's flight went continue to other points on its routes beyond Hawaii.

President Truman declared that the national security and the public welfare required establishment of the route. Direct and regular air service possible between the northwestern United States and points on Pan American's existing routes in the South Pacific, the Philippines, Japan and other parts of the Orient.

## CAB Critic

### Airline economist offers 13-point plan to solve problems facing carriers.

W. L. McMillan, director of economic planning for American Airlines, criticizes the Civil Aeronautics Board last week for following "unworkable competition" and advanced a 13-point program as a solution to airline ailments.

He blamed before the economist meeting of the Society of Automotive Engineers at Los Angeles, explaining that the plan he suggested was his own and he was not speaking for American Airlines. McMillan declared that the continued (a) lack of competition, (b) lack of high quality, (c) constant fare increases, and (d) delays paid upon delays put in route duplication is now paid upon route duplication may exist for a short time, but they are palliatives, not cures.

Confusing against using only one or a few of his suggestions, the American Airlines official presented his entire 13-point recommendation as a package for a

collective or integrated remedy.

•**Remedy Offered.**—The program proposed the following:

1. The industry can and must make further economies by new methods and management of present operations.

2. The industry can and must be more aggressive and responsive to its selling.

3. Completely permit air better prices and security.

4. Stop outlasting more competition.

5. Stop encouraging non-certificated carriers, to offset operating a scheduled service in direct violation of the regulations, should be stopped now. CAB has made a mistake, but its legal processes are slow.

6. Stop encouraging non-certificated carriers to operate on routes.

7. Permit and allow airlines any route merger or consolidation that makes sense, at least if it brings about a reduction in number of services between cities.

8. The airlines should initiate and the CAB should permit and encourage promotional rates and fares which result in filling seats as space now remains empty for the operators of these airlines.

9. Use the palliatives of high outside, increased fares, and government loans only in those areas where it is clear that financial soundness of the carrier is at stake in a short period.

10. CAB should use its power of air freight plane interchange to a greater extent.

11. After some of the ridiculous competitive subsidies are eliminated, the rate and fare structure should be as close as it can be made to make each airline pay for its loss to the rest of the industry.

12. Discontinue any "one stop" subsidies against competitive air lines.

13. The transportation tax should be eliminated.

## State Regulation Challenged

A protest on behalf of all certificated lines operating in Indiana against state economic regulation of scheduled air carriers was made recently by Warren N. Martin, research assistant in TWA's governmental affairs department. As spokesman for TWA, American, Chicago, Southern, Delta, Eastern and United, Martin urged the Indiana American Commission to discontinue "ill advised legislation which would seriously jeopardize the further development of air transportation not only in Indiana but throughout the United States."

## Nonskeds in Middle Of Three-Way Squeeze

A three-way squeeze applied by CAB, the Federal courts and the scheduled airlines was tightening around at least one nonscheduled carrier operator early this month, although the unscheduled carriers were taking steps to ease the pressure.

Court proceedings against Standard Air Lines, a nonscheduled operator, and Modern Air Transport, which flies the New York-Portland route, were at a critical point last week. American Airlines was seeking a temporary (a) permanent injunction against Modern in New York District Court, and service of CAA's order of Aug. 4 suspending SAA's letter of authorization still was pending in the U. S. Circuit Court for the District of Columbia.

•**Reinstatement Cases.**—CAB is making a temporary (a) permanent injunction against Modern in U. S. District Court for the Southern District of New York to review the company's "further and continued violation of the Civil Aeronautics Act." Other enforcement proceedings under new before CAB include Viking Airlines, NAVAir Transport Service, Golden North Airways, McMillan Airways, American Air Transport, Transocean Air Lines and Virgin Island Air Service, all of which operate temporary flights.

The Board is also investigating a TWA complaint against Seaboard & Western Airlines.

Latest CAB action was the suspension of letters of authorization held by the large irregular operator for failure to file proper reports with the Board. The terms are Atlanta Southern Airlines, Seattle Burke Air Transport, Miami Delta Shuttle Co., Brownsville, Tex., Golden Airways, Long Beach, Calif., Northern Airlines, Seattle, and Virgin Island Air Service, Miami Springs, Fla. (a member for Northern Airlines, for a time one of the largest operators on the Pacific Northwest-Alaska route, was reported recently).

•**Washington.** Meeting Set-McMillan, the newly-formed Independent Air Carrier Association (Aviation Week, Sept. 13) has invited all CAB members and the Civil Aeronautics Administrator to attend a meeting in Washington Oct. 18 and 19 "to seek constructive answers to the problems and issues affecting long noncertificated operators."

McMillan asked CAB to withhold further action against the operations and interests of large irregular carriers until after this session.

Five members of the Air Cares Association, composed of transportation-unsubsidized operators, have applied to CAB for immediate hearings on their applications to establish regularly

scheduled service. Standard Air Lines, Air Transport Carriers, Viking Airlines and Air America—all based in California—said that further delay will permanently deprive the public of inexpensive carrier service.

The monthly New York-Chicago fares are now about 500 lower than those charged by the certificated airlines. But at least one of the scheduled transportation lines may follow the lead of Pan American Airways and Capital Airlines by establishing low-cost "daybreak" service.

## Airlines Hear Details On TWA Money-Saving

TWA's economy program, which has paid costs more than \$100,000 monthly during the past year, was explained to representatives of 16 airlines during a three-day meeting called by the Air Transport Association at Kansas City, Mo., for the eighth annual meeting of the company's "all-awards program" in the budgetary control field.

Henry McGraw, director of TWA's budgetary control department, explained that constant amendments over all costs has resulted in big and little savings which amounted to a substantial figure in a year's time. Recent operational changes alone are estimated to have saved the company \$100,000 monthly.

•**Personal Cost Book.**—During the last 16 months, personnel has been out of business 17,000 to 18,500. With 17,000 personnel, TWA's cost about \$100,000,000 annually. The year, with 1900 fewer employees, a \$100,000,000 cost increase is anticipated.



OVERHAUL DOCK FOR CONNIES

Post Pan American Airways' overhaul is in the company's Miami shop in a specially constructed dock undergoing an eight-hour overhaul after flying 800 to the Iron-Armory Clippert. Since then made by PNA's Atlantic division

Typical of many smaller conversions was a saving of \$7500 annually, it was pointed out. In the case of certain other conversions were made to have a laundry furnish them for in order to get the cleaning business. Disfilled water was eliminated from water used in fact at city water, with savings of \$15 to \$30 monthly per car at the value's 32 airport station office.

New York's loss was slashed from 1920 to 1000 in one year, and within another year it is hoped the total can be further reduced to less than 800. Savings in this category are estimated at \$10,000 monthly.

•**Cooperative Arrangements.**—Flare space occupied by the company's offices in the U. S. alone was appraised critically, with resulting economies aggregating more than \$25,000. This was done by sub-leasing wanted office space in other offices or commercial firms. In Chicago, a jewelry found just of the downtown hotel office, and Chicago's Southern Air Lines took over unused space of the Kansas City hotel company. Cooperative arrangements are in effect with other airlines at 27 points.

Economies of \$1000 a month were achieved by close cooperation of long distance telephone units and elimination of duplicating telephone instruments. Additional thousands of dollars were saved by reducing food wastes. On time flight performance was increased, helping to reduce employees' overtime pay.

•**Two-Mile Cuts.**—A V. Larkin, TWA's vice president and treasurer, summed up the results of the economy program. He said that in the first six months of 1947 the company lost 70,146,000 pounds (one million at a cost of 15¢ per one a free mile).











# EDITORIAL

## Operation Whirlwind—Helicopters Proven

A little group of 31 men completed a test's spectrum of the world's first scheduled commercial helicopter service Oct. 1, and a civil helicopter built a significant addition to airlines today and public service.

Los Angeles' Aeronautics group call their effort "Operation Whirlwind." It all began when LAA was organized in 1944 and applied to CAB for a mail certificate, which was granted in May 1947, for a three-year period. Service started Oct. 1, 1947. For the first schedule within a 50-mile radius of Los Angeles airport are served their daily-schedule night flights—on their routes. A fourth segment in Los Angeles' internal service Post Office is flown 22 times daily, frequently with a full doors open system.

Never has the post office helicopter been given such an opportunity to prove its worth. Never did a spinning airship carry such mail and service.

For the helicopter proved itself. For beyond expectations. Although performance was over 90 percent every month except one, from November through June, Operations costs have been reduced. Public enthusiasm is at a peak. Air mail stage has been dropped at all of the suburbs as well as the main post office. Safety record is perfect. Service interruptions due to mechanical difficulties have been almost nil. The response reports to complete 1948 is the best. Even better service is ahead.

"The reliability and safety of the helicopter is virtually a proven fact," LAA's president and director, Clarence Nelson, reports. "It is a credit of our own company's operation. It is a credit of the AHA-4. It is the product of our \$400,000 purchase. It is a credit of the \$1,750,000 cost of mail and parcel post in its first year. It delivers the mail in minutes instead of hours. Presently, it takes as long for a letter to travel between the terminals of the metropolitan area as it did to cross the continent."

LAA has 315 route miles. It is performing close to \$1,000,000 per month in mail. In September it carried 273,516 lbs. In its first month it carried 31,161 lbs. It has over 400 revenue items a month, and about 15,000 revenue miles. Total operating expense was \$1.36 a mile in August; \$2.12 in July, in contrast to \$1.30 in October, 1947.

Public response to LAA has caused the company. From March to August LAA's passenger loadings at Burbank increased 25 percent, Burbank increased 145 percent; Culver (near San Bernardino, Calif.) and Bloomington went up 416 percent; Glendale 212 percent; Santa Monica 235 percent, and Van Nuys 200 percent. P. O. 415 percent.

Response at the U. S. Post Office Department has been equally impressive, although since the acquisition of Civil Service, the new second-class postmaster general in charge of mail. P. O. officials have given considerable praise for the launching mail helicopter helicopter service. Nevertheless, the Department in behalf of LAA, urged the Civil Aeronautics Board to "consider as soon as possible beyond 50 miles from downtown Los Angeles as required for potential development of service by Los Angeles Airways, Inc."

Despite its exceptional problems and costs, LAA's loss for the year ended Dec. 31, 1947, was only \$23,460. Indeed it that

date was \$30,993, made of it required during the early expensive period in getting an application for a mail certificate. Indeed, the certificate, which was not granted. At Dec. 31, 1947, costs totaled \$30,926.

Nearly all of the company's recent is mail transportation. CAB originally set a rate of 10¢ a mile. This was reduced from 10¢ to 5¢ a mile for the retroactive period Oct. 1, 1947, to Sept. 30, 1948. On and after May 1 the rate is 11.25¢ for the first 55,000 miles in one month and 75 cents a mile over 55,000. Cost to helicopter based on latest P. O. data, for July, is about 55¢ with per cent.

In a year of spending costs elsewhere, LAA has not expense 100 percent. Despite high manufacturing development costs, plus the fact that light equipment is being developed on a three-year basis with a 10 percent margin, the company expects to close 1948 with a profit. Not profit to Sept. 1 was \$3,091.

What of the future? "But, actually helicopters will have only about half as many parts and the human expense becomes more efficient with experience. It is not unrealistic opinion that in the speed and size of helicopters increase the two ends will decrease so as to compete favorably with that of any other type of vehicle. This, coupled with the ever-increasing air mail loads will result in virtually a helicopter conveyor system between the large airports and downtown centers."

LAA has no intention for higher and more from the government. It will fight to cut them. The service is now expected and government approval for carrying mail passengers. Indeed, since AHA-4 is an automatic, cockpit passenger and cargo pilot. The first flight program could then be moved as a test material in the company's network, which now operates 234 light aircraft every day at Los Angeles Airport. Even a smaller price index of the passenger potential will keep the company in the black with lower mail transportation, before delivery. It would be a substantial amount to see what the real problem could be. I see, had a helicopter which could carry as much as passengers at 25 cents a mile, which is about what airlines charge.

"We have come to believe that sometime in 1950 two-engine helicopters of approximately 4000 lb. gross weight will be available, which will be capable of operating with one engine at 120 mph, cruising speed. Based on that it would appear it would be authorized to fly a straight line flight of 22 miles in the report and the Federal Aviation Board. This, plus the added speed of the new helicopter, will result in a flying schedule of six minutes. The present low unpowered glider, airplanes and modifications of the wartime Sikorski Model H-5, now most often used as a mail carrier, flying 15 miles in 22 minutes.

LAA's 1949 development program centers on automatic flight and navigation. Before will concentrate on a modified three-dimensional rotor body. Although it will be only in the experimental stage, it, with other experiments planned, should result in "extremely simplified, reliable, and economical." Los Angeles Airways gave down in its history books as a vital piece of flight. Its year's achievement is enormous. Its future is assured.

ROBERT H. WOOD



ANOTHER NEW PRODUCT BY A WOMAN USING A DU PONT PLASTIC

## CEILING ZERO...RECEPTION UNLIMITED

Antenna fittings insulated with Du Pont polythene cut precipitation static as much as 90%



Here is a typical example of low poly thene-insulated fittings are installed in an actual baby antenna system. Single design makes these fittings easy to handle quickly to install, with no special tooling required. Because of their rugged qualities, maintenance costs stay low, replacement is increased. And as further indication of the versatility of polythene, polythene-insulated wire is recommended for use with this system.

Even in the worst of weather, pilots now can count on fair weather radio reception, thanks to extreme fittings insulated with injection-molded Du Pont polythene. With these fittings, new antenna systems control up to 90% of static. Data such as noise is changed, thunder clouds, rain, dust, and snow and then help to minimize a serious hazard to safety.

High dielectric strength and moisture-resistance make Du Pont polythene an excellent material for the job. These polythene-insulated antenna fittings resist a 100-kilovolt stress even after repeated aging cycles over a temperature range of -80° to 130°F. And tough, mechanical polythene withstands mechanical vibration and rough treatment. Light in weight, capable of being molded with precision, Du Pont polythene is right from every angle.

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- MOTORS AND CONTROL
- INSTRUMENTS
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- CABIN SUPERCHARGERS
- GAS TURBINES  
FOR JET PROPULSION
- IGNITION AND POWER SYSTEMS
- ACTUATORS
- GENERATORS  
AND TRANSFORMERS

The North American F-86, powered by a General Electric TG-190 (USAF Type J47) turbo-jet engine, is the "blue ribbon" winner of the new official world speed record of 670.981 miles an hour.

Piloted by veteran ace Major Richard L. Johnson, the turbo-jet plane bettered its own unofficial record of 669.75 mph set at the National Air Races at Cleveland. The F-86 was completely armed and carried a full complement of ammunition. The new record was announced on Air Force Day by General Hoyt S. Vandenberg, Chief of Staff of the Air Force.

The TG-190 power plant of the super-streamlined F-86, was developed and produced by G-E's Aircraft Gas Turbine Divisions at Lynn, Mass. The former speed record of 650.796 miles per hour was set by a Navy Douglas D-558 "Skystreak" propelled by the General Electric designed TG-180.

General Electric research and engineering works continuously to improve existing products and to devise new means to assist its associates in the aviation industry. G-E leadership in the development and production of engineered systems and precision products for aircraft is available to you by contacting your nearest G-E office. Apparatus Department, General Electric Company, Schenectady, New York.

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